Undergraduate Admissions Assessment March 2017
TEST 1 - (Sections A, B1 and D). Three Hour Assessment.

The UG Admissions Assessment (UGAA) gives Admissions Tutors the opportunity to see a sample of the applicant's original work, produced under examination conditions, and seeks to assess applicants from a variety of backgrounds in a fair and equitable manner.

The assessment has three sections: comprehension exercises (**Section A**); essay questions (**Section B**); and mathematical problems (**Section C** *or* **D**). The purpose is to assess the applicant's English language and mathematics abilities. *It is not an assessment of general knowledge.* The following criteria are of particular importance:

- Clarity and precision of language
- Sophisticated vocabulary
- Logical structure and argument
- Mathematical accuracy, techniques and conceptual understanding

Before beginning the assessment, please read the following guidance and instructions carefully.

TEST 1

Depending on the course to which you have applied, you have been entered for Test 1 or 2. Before beginning the assessment please check that you have received the correct paper. A list of courses and corresponding papers can be found overleaf.

The assessment lasts three hours and **all three sections must be completed**. The marks for each section are weighted according to the paper. More time should be spent completing the sections with more marks attached. However, please note that to pass the UGAA a minimum grade in *all three sections* is required, as well as a good grade overall.

Test 1: Section A **(25%)**, Section B1 **(25%)**, Section D **(50%)**
Test 2: Section A **(25%)**, Section B2 **(50%)**, Section C **(25%)**

Answer Booklets

You must use the **BLUE** booklet for Sections A and B (English Sections) and the **CREAM** booklet for Sections C or D (Maths Sections).

When answering the maths questions, you must show your working out, as well as your final answer.

- Dictionaries may **NOT** be used
- Hand-held calculators **MAY** be used.

If a calculator is used please indicate on the answer booklet the type used (e.g. TI.500)

Test Papers

TEST 1

BSc Actuarial Science (N321)
BSc Business Mathematics and Statistics (G0N0)
BSc Economics (L101)
BSc Economics with Economic History (L1V3)
BSc Econometrics and Mathematical Economics (L140)
BSc Economic History with Economics (VL31)
BSc Economics and Economic History (V3L1)
BSc Environmental Policy with Economics (F9L1)
BSc Finance (N300)
BSc Financial Mathematics and Statistics (GN13)
BSc Government and Economics (LL12)
BSc Geography with Economics (L7L1)
BSc Management (N200)
BSc Mathematics and Economics (GL11)
BSc Mathematics with Economics (G1L1)
BSc Philosophy and Economics (LV15)
BSc Philosophy, Politics and Economics (L0V0)
BSc Social Policy and Economics (LLK1)
BSc Statistics with Finance (G3N3)

TEST 2

BSc Accounting and Finance (NN34)
BA Anthropology and Law (ML16)
BSc Economic History (V300)
BSc Environment and Development (FK84)
BA Geography (L702)
BSc Government (L230)
BSc Government and History (LV21)
BA History (V146)
BSc International Relations (L250)
BSc International Relations and History (VL12)
LLB Law (M100)
BSc Philosophy, Logic, and Scientific Method (V503)
BSc Politics and Philosophy (LV25)
BSc Politics and International Relations (L290)
BA Social Anthropology (L601)
BSc Social Anthropology (L603)
BSc Social Policy (L400)
BSc Social Policy with Government (LL42)
BSc Social Policy and Sociology (LL34)
BSc Sociology (L301)

Please check you have received the correct paper. If you think you have received the wrong paper please notify the invigilator immediately.

The Undergraduate Admissions Assessment

TEST 1

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Section A

- **All** candidates should complete this section.
- This section has **one** question only.
- The marks achieved in this section account for **25%** of your final exam result.

Instructions:

Write a summary (précis) of the following passage, **in not more than 150 of your own words**. You must write a summary, not a discussion of the passage. No credit will be given for answers made up of sentences extracted from the original passage.

Rupert Murdoch has written to the Guardian to deny he ever claimed that Downing Street does his bidding, as a bid by his US film and television group to acquire Sky is due to be formally notified to ministers.

The media mogul, who is chairman of 21st Century Fox, wrote: "I have made it a principle all my life never to ask for anything from any prime minister."

In a rare move to write directly to a newspaper, Murdoch disputed a quote attributed to him in the Guardian and elsewhere in which he reportedly said: "When I go into Downing Street, they do what I say; when I go to Brussels, they take no notice."

In his response, Murdoch added: "There is much fake news published about me, but let me make clear that I have never uttered those words."

The intervention comes at a highly sensitive moment for Murdoch's business interests, with Fox's proposed £11.2bn takeover of the 61% of Sky he does not already own expected to be notified to the UK government for approval.

The culture secretary, Karen Bradley, has 10 working days from being notified to tell the regulator Ofcom whether a public interest investigation into the proposed takeover should be launched.

The former Labour leader Ed Miliband and former business secretary Vince Cable have called for the takeover to be blocked and referred to the regulator.

A previous attempt by a Murdoch company to acquire the remaining part of Sky was withdrawn in the summer of 2011 at the height of the phone-hacking scandal, which was exposed by the Guardian and led to the closure of the News of the World.

However, Fox, the company bidding on this occasion, does not own the newspapers; they are published by a separate business, News Corporation. The newspapers were hived off in the wake of the hacking scandal.

Robert Booth, 'Rupert Murdoch: "I've Never Asked Any Prime Minister for Anything," The Guardian, 19 December 2016.

Please turn over for Section B.

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Section B1

- Complete Section B1 **ONLY** if you are completing Maths Section D.

- The marks achieved in this section account for **25%** of your final exam result.

Instructions:
Write **ONE** essay from the following three choices:

1. 'Referenda are a bad way to make political decisions.' Discuss.
- What are the strengths and weaknesses of making decisions by referenda?

2. 'Transnational actors are becoming more important than the state.' Discuss.
- How important are transnational actors in contemporary international politics?

3. 'Although it creates plenty of losers, free trade is always preferable to protectionism.' Discuss.
- What are the advantages of free trade?

Please turn over for Section D.

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Section D

- The marks achieved in this section account for **50%** of your final exam result.

- Full algebraic working out must be clearly shown.

Instructions:
This section has **nine questions**, with a total of **100 marks**. Answer **all** questions in this section.

Question 1

Simplify:

$$\frac{3}{2x^2 - 11x + 15} - \frac{2}{4x^2 - 25}$$

Total 5 marks

Question 2

a) Find exact values for the coordinates of the points of intersection for the following:

$$y = 2 - 4x$$
$$y = x^2 - 1$$

(3 marks)

b) Write down the range of values of x for which

$$2 - 4x > x^2 - 1$$

(2 marks)

c) **Hence** or **otherwise** solve

$$|2 - 4x| > x^2 - 1$$

(3 marks)

Total 8 marks

Question 3

Solve the following equations for x giving your solutions exactly and showing a full algebraic method.

a) $x^3 - 2x^2 - x + 2 = 0$

(4 marks)

b) $lnx + 2 = lnx^2$

(3 marks)

c) $2e^{2x} + 5e^x = 3$

(4 marks)

d) $\sqrt{2}\,sin\,x = tan\,x \qquad 0 \leq x \leq 2\pi$

(5 marks)

Total 16 marks

Question 4

a) Express $f(x) = x^3 - x^2 - x - 2$ as the product of a linear factor $g(x)$ and a quadratic factor $h(x)$.

(3 marks)

b) Explain why $f(x)$ cannot be written as the product of 3 linear factors.

(2 marks)

c) Express $\frac{x^3+3x^2-2x-2}{x^3-x^2-x-2}$ in the form $A + \frac{Bx+C}{h(x)} + \frac{D}{g(x)}$

where A,B,C and D are integers and $g(x)$ and $h(x)$ are the factors found in part a)

(9 marks)

d) **Hence** find $\int \frac{x^3+3x^2-2x-2}{x^3-x^2-x-2}\, dx$

(3 marks)

Total 17 marks

Question 5

a) Sketch the curve

$$y = \frac{x^2-a^2}{x^2-b^2} \quad \text{where } 0 < a < b$$

Show the equations of any **asymptotes** and the **coordinates of the points of intersection with the axes** clearly on your sketch.

(5 marks)

b) **Hence** write down the range of values of y for which there are no solutions to

$$y = \frac{x^2-a^2}{x^2-b^2} \quad \text{where } a > b > 0$$

(2 marks)

c) **Find** the range of values of y for which there are no solutions to

$$y = \frac{x^2-a^2}{x^2-b^2} \quad \text{where } a > b$$

(2 marks)

Total 9 marks

Question 6

A bouncy ball is dropped from a height of 2m

Each bounce has a maximum height of $\frac{4}{5}$ of that of the previous bounce so the height of the first full bounce is 1.6m.

a) What is the height of the second full bounce?

(1 mark)

The ball will have travelled a total distance of 5.2m at the end of the first full bounce.

b) What distance will the ball have travelled at the end of the second full bounce?

(2 marks)

c) Write an expression in terms of *n* for:

i) The height of the *n*th full bounce

ii) The distance travelled at the end of the *n*th bounce

(3 marks)

d) How many full bounces will the ball complete before the height of each bounce falls below 2cm?

(4 marks)

e) Explain why the total distance travelled by the ball will never exceed 18 m.

(1 mark)

Total 11 marks

Question 7

a) Differentiate the following expressions with respect to x and simplify your answers:

i) $x \sin x$ ii) $\frac{x}{\sin x}$

(4 marks)

b) Find the following indefinite integrals:

i) $\int x \sin x \, dx$ ii) $\int \cos x \; e^{\sin x} \; dx$

(5 marks)

c) On the same axes sketch $y = x \sin x$ and $y = \sin x$ for $0 \leq x \leq \pi$ showing the exact values of the coordinates of any points of intersection.

(4 marks)

d) Find the equation of the tangent to $y = x \sin x$ at the point $x = \frac{\pi}{2}$

(2 marks)

e) Find the area enclosed by the tangent found in d) and the curves

$y = x \sin x$ and $y = \sin x$, giving your answer exactly.

(4 marks)

f) Explain why the maximum point to the curve *y = xsinx has x coordinate which satisfies the equation* $x = -\tan x$ *and takes a value greater than* $\frac{\pi}{2}$

(2 marks)

Total 21 marks

Question 8

The outside of a vase is modelled by rotating the curve $25x = y^2 + 75$ by 2π radians about the *y* axis for $-5cm \leq y \leq 5cm$

a) Find the volume enclosed in terms of π (show all of your working).

(6 marks)

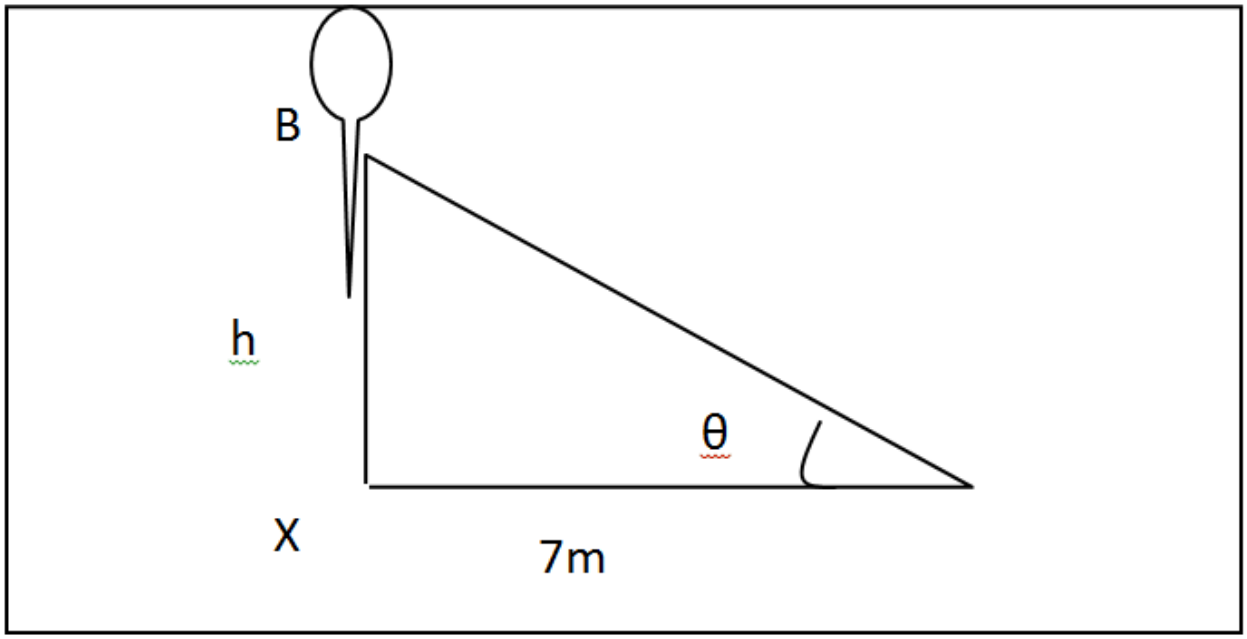
The vase is tightly packed into a cylinder of the same radius and height.

b) What percentage of the volume of the cylinder is not occupied by the vase?

(3 marks)

Total 9 marks

Question 9



A balloon B is rising vertically from a point X at a constant speed of 2 m/s.

A child is standing a horizontal distance of 7m away from X.

The child watches the balloon rise.

Assuming the height of the child is negligible find the rate in rad/s at which the angle θ made with the horizontal (as shown in the diagram) is increasing when $\theta = \frac{\pi}{4}$

Total 4 marks

End of Test